

Chapter 4

Typical Aircraft Rigging Procedures

This chapter covers the typical rigging procedures used when recovering disabled rotary-wing and fixed-wing aircraft. Unfortunately, not all these downed aircraft are in a condition that will enable aerial evacuation using the I-UMARK, UMARK, or HERK. Critical attachment points and/or the airframe itself may not be structurally sound. Therefore, ARK may be used with other recovery kits to perform the recovery. This operation will enable the return of aircraft for logistical considerations or to complete extensive repairs.

PROCEDURES

4-1. The ARK, described in chapter 3, is designed for the safe aerial recovery of disabled aircraft using the suspension system. It also is used to rig aircraft for ground recovery. The recovery officer or BDAR assessor determines which aerial recovery method to use. Care should be exercised to prevent further structural damage. Stations given for rigging are approximate. Some minor alignment may be necessary to prevent further damage. More positioning of straps may be required. Load spreaders should be supported from above until load is lifted.

4-2. The structure of downed aircraft may require strengthening before extraction. The recovery officer/BDAR assessor should evaluate the overall structural soundness of the aircraft before extraction. The purpose of the examination is to determine the effects of components upon compromised structural integrity. Components should be removed to relieve structural stress. Compromised stringers and longerons should be reinforced or repaired to prevent the breakup of the airframe upon extraction.

WARNING

All safety precautions will be strictly followed during all recovery procedures. If safety precautions are not strictly followed, loss of life could possibly occur.

CAUTION

Exercise caution when bellybanding an aircraft that has sustained crash damage because of a weakened airframe structure. BDAR assessors must pay particular attention to structural damage when performing BDAR.

CAUTION
The maximum weight to be lifted with the aerial recovery kit should not exceed 21,600 pounds.

CAUTION
Using the bellyband method may cause additional sheet metal damage.

NOTE: Whenever possible, multiple lifting systems should be used in with the bellyband method to relieve the stress and provide redundancy for the primary system.

4-3. Typical bellyband rigging procedures are as follows:

- Extend the bellyband assemblies (two each) to their full length (about 33 feet each) and remove the twist from the straps.
- Attach the chain leg, the positioning strap anchor, and the coupling links to the bellyband links as specified for the particular aircraft to be recovered. (Fig. 4-1 shows the general assembly configuration.)
- Attach the load spreaders (four each) to the fuselage of the disabled aircraft as specified for the particular aircraft to be recovered using two positioning straps and two positioning strap anchors (1670EG075A3) for each arrangement. (Fig. 4-2 shows the general configuration.)
- Position the bellybands at their appropriate stations. Align the index mark on the bellyband with the fuselage centerline (Fig. 4-3). Tie the bellybands to the fuselage using a positioning strap and the positioning strap anchor (1670EG075A1).
- Thread the bellyband straps through the positioning strap anchors (Fig. 4-1, Fig. 4-2, and Fig. 4-4).
- Attach positioning straps as required. Tighten all positioning straps evenly. Ensure that the bellybands remain at their straps evenly and at their proper fuselage station.
- Secure the bellybands to the spreader bar or rotor head shackle as specified for the aircraft to be recovered.
- Attach antichafe pads to the bellybands as specified under the rigging procedures for the particular aircraft to be recovered.
- Roll all loose ends of the straps; pad and tape them as required.

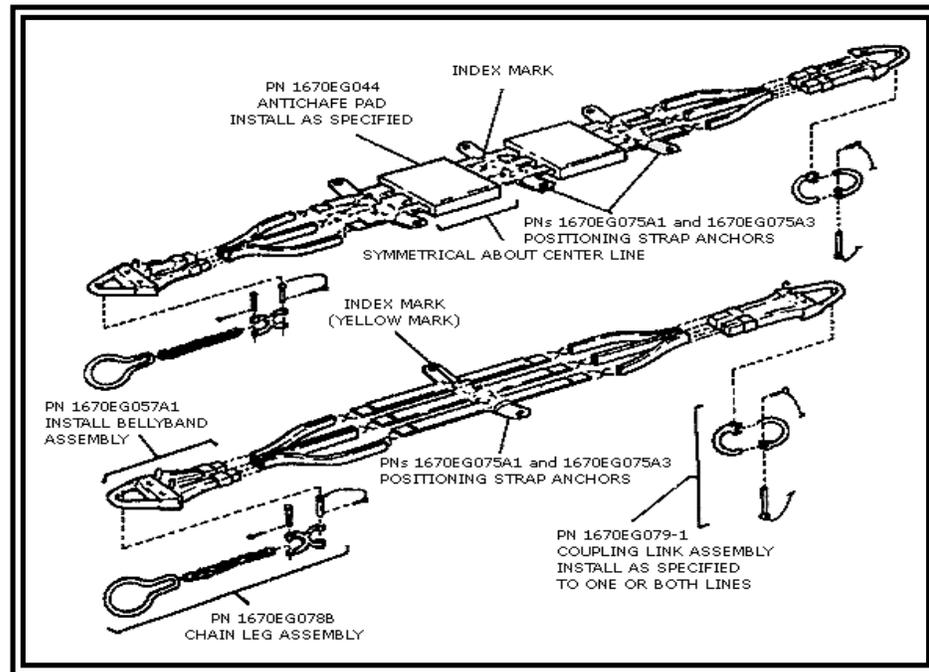


Figure 4-1. General Arrangement of Bellyband Installations

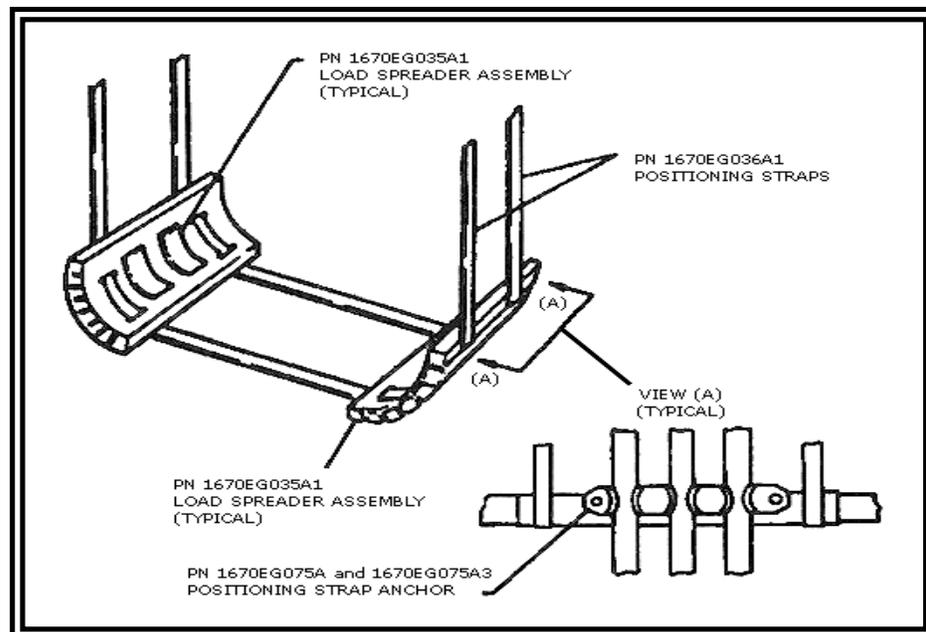


Figure 4-2. General Arrangement of Load Spreader Installation

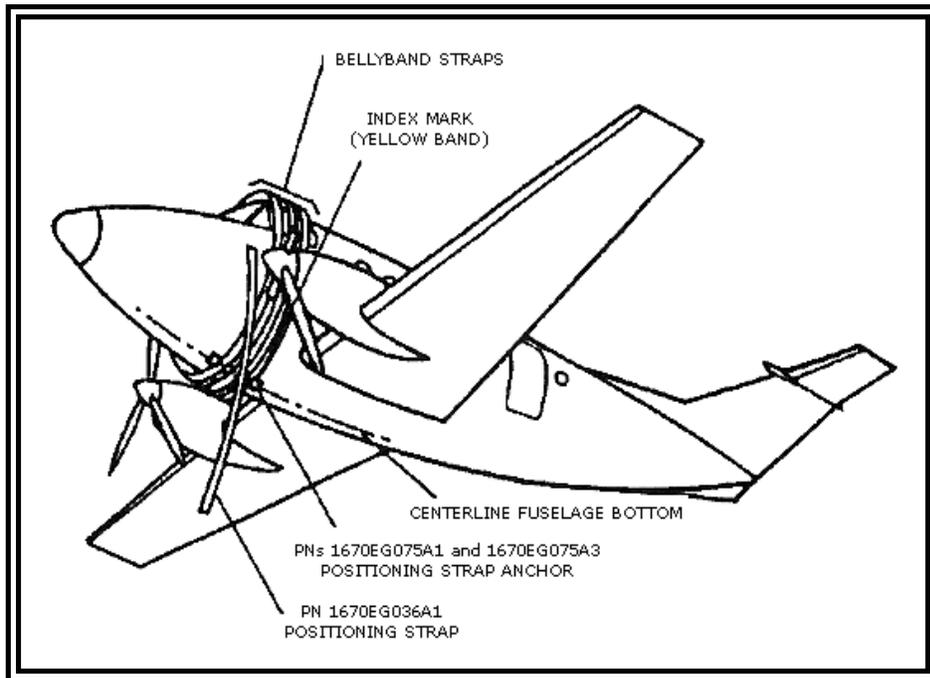


Figure 4-3. Typical Indexing of Bellyband to Fuselage

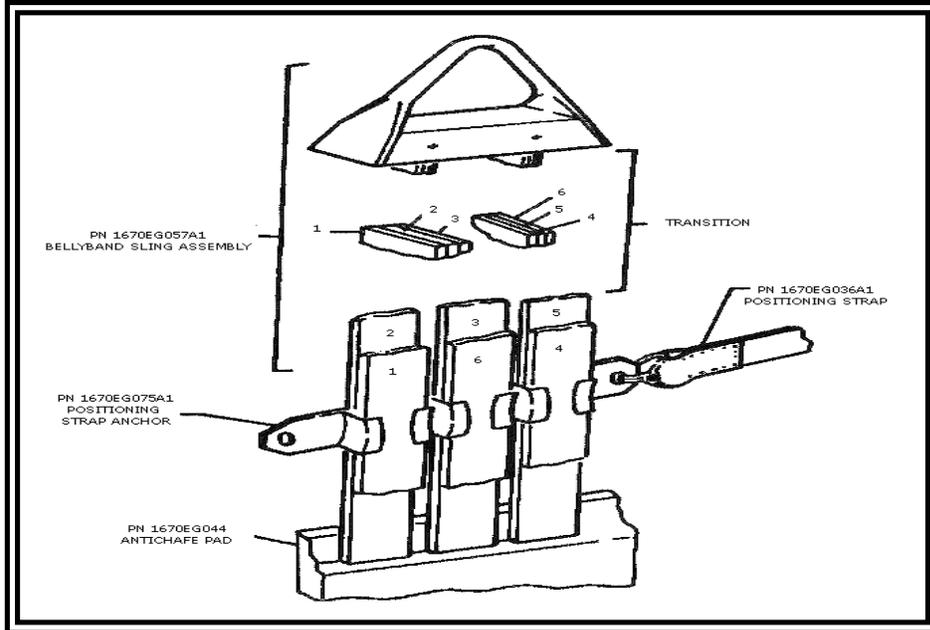


Figure 4-4. Typical Applications of Positioning Anchor

ASSEMBLY OF SUSPENSION COMPONENTS

4-4. The assembly of the suspension components includes these actions:

- Attach the bellybands to the spreader bar shackle.
- Adjust the length of the spreader bar.
- Attach the pendant assemblies to the pendant adapter (primary and alternate methods).
- Install the rotor head sling.
- Attach the bellyband assemblies to the lift pendant.

ATTACHING BELLYBANDS TO THE SPREADER BAR SHACKLE

4-5. Figures 4-5 and 4-6 show the typical connections between the bellybands and the spreader bar shackle. Figure 4-5 shows direct connection between these two suspension components. Figure 4-6 demonstrates the use of coupling links, grab links, and/or the chain leg assembly in connecting the bellybands to the spreader bar. Figure 4-6 shows the coupling link assembly connected to the spreader bar.

Bellyband Link or Grab Link Attachment

4-6. Attach the bellyband link or the grab link to the spreader bar shackle as follows:

- Remove the quick-disconnect pin from the shackle clevis pin and slide the clevis pin out from the forked end. Note that this also releases the spreader bar straps from the spreader bar assembly (Fig. 4-5, View A).
- Slip the spreader bar shackle through the bellyband link (Figure 4-5, View A) or through the grab link (Fig. 4-6). Note that while Figure 4-5 shows two bellyband links being attached to the spreader bar shackle, there are cases in which only one bellyband link will be attached.
- Reassemble the parts to the spreader bar assembly.
- Ensure that there is no twist in the spreader bar straps.

Coupling Link Attachment

4-7. Attach the coupling links to the spreader bar shackle (Fig. 4-6) as follows:

- Disengage the quick-disconnect pin of the coupling link assembly.
- Remove the clevis pin from the coupling link and separate the two links.
- Pass one coupling link over the spreader bar shackle.
- Mate the other link with that in the step above.
- Insert the clevis pin through the coupling links and engage the quick-disconnect pin.

ADJUSTING LENGTH OF THE SPREADER BAR

4-8. Adjust the spreader bar length as follows:

- Disengage the quick-disconnect pins from the pin assembly (1670EG052A) (Fig. 4-5).

- Remove the pin assembly from the tube.
- Select the correct length for the spreader bar assembly and reinstall the pin assembly.

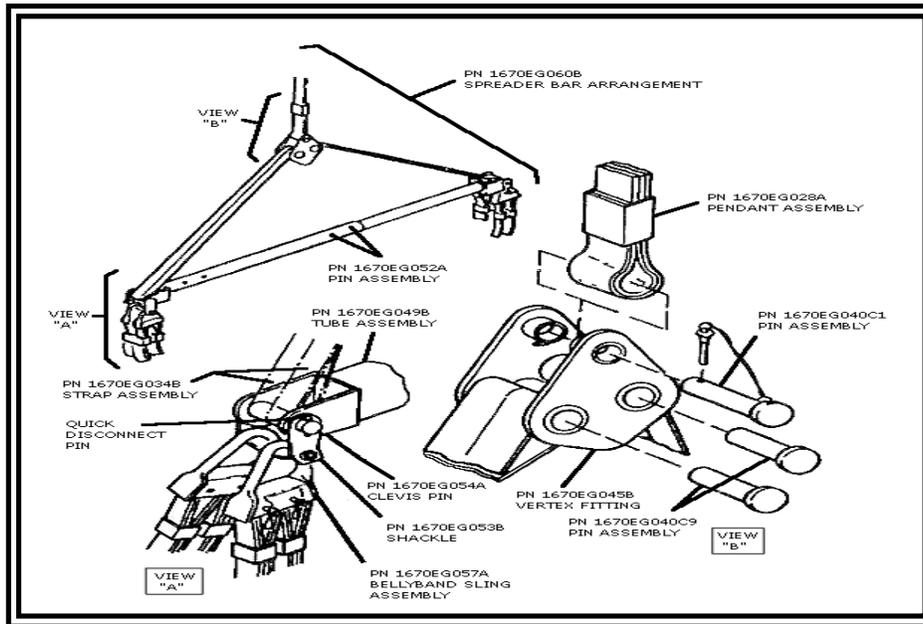


Figure 4-5. Typical Spreader Bar Arrangement

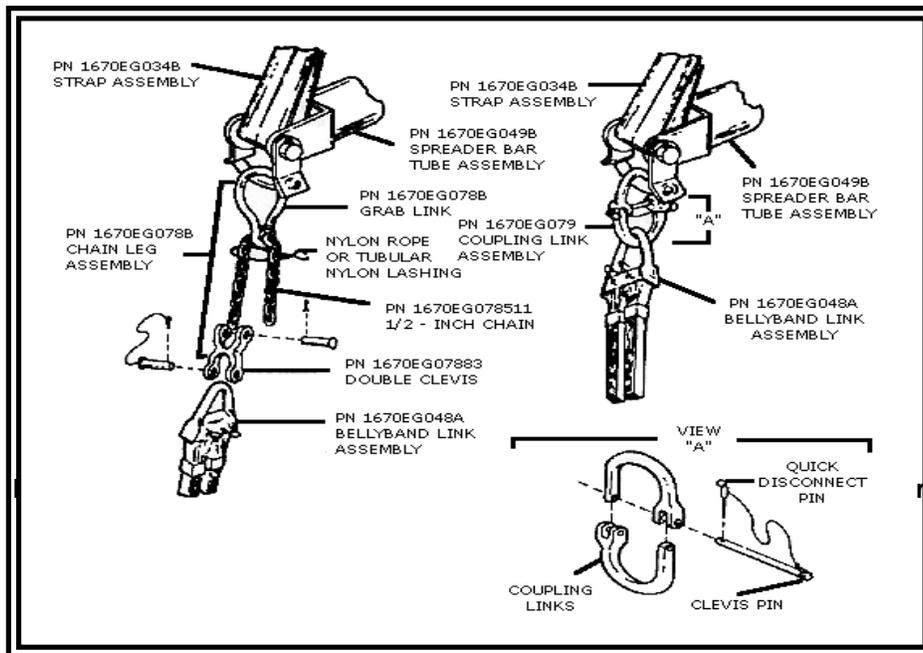


Figure 4-6. Typical Arrangements of Bellyband Arrangements to Spreader Bar

ATTACHING PENDANT ASSEMBLIES TO PENDANT ADAPTER

4-9. The two methods of attaching the pendant assemblies to the pendant adapter are described in the paragraphs below.

Primary Method

4-10. Figure 4-7 shows the typical connections between the pendant adapter and the pendant assemblies. The two pendant assemblies (1670EG028A1, 1670EG028A3) are identical except that one pendant assembly has only one ring assembly (1670EG069). The additional ring on the 1670EG028A3 pendant assembly attaches to the cargo hook. This ring cannot be disassembled. The intermediate rings (1670EG070B) can be disassembled.

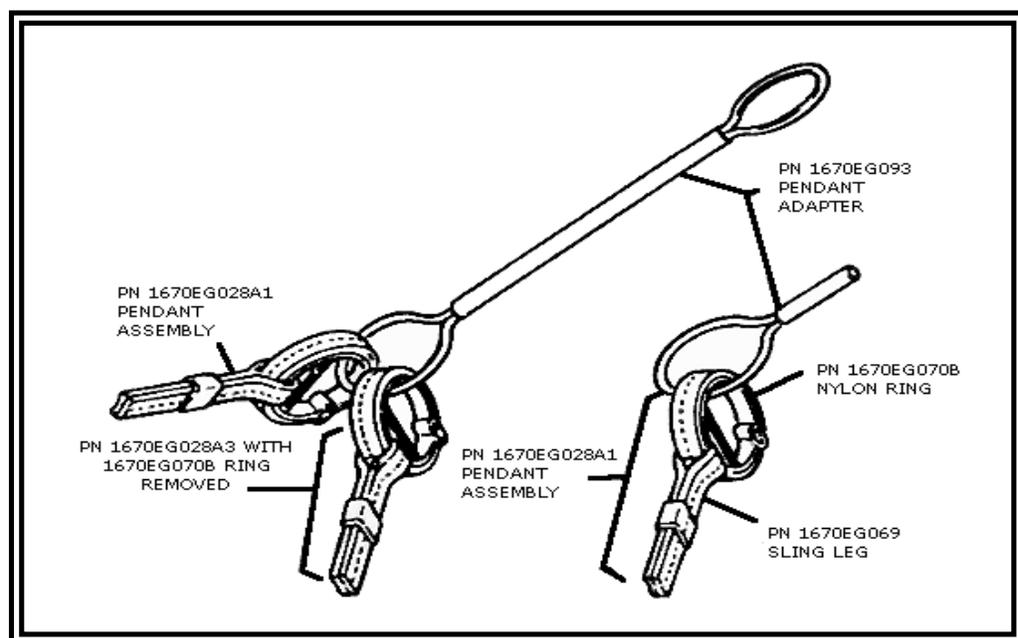


Figure 4-7. Pendant Arrangements

NOTE: Care should be exercised when attaching the pendant adapter and the pendant assemblies in the double-leg configuration. Both nylon doughnuts of the pendant assembly should be connected to the loop of the pendant adapter (Fig. 4-7).

4-11. Attach the pendant assembly to the pendant adapter as follows (Fig. 4-8):

- Remove the nuts (6) from the link assembly.
- Separate the links (4), bolts (3), and bushings (5) from the webbing (1).
- Unwind the ring (1).

- Reassemble the nylon ring, but encircle both the pendant adapter loop and the sling leg loop. To assemble the ring, refer to Figure 4-8 and perform the following steps:
 - Lay the webbing (1) out flat with the nylon sleeve (2) over the shorter stitched end.
 - Slip the sling leg (7) over (1).
 - Form the webbing (1) into an approximate 8-inch-diameter circle beginning from the shorter stitched end.
 - Wind the webbing, forming three turns. Adjust the webbing so that the sewn loops are positioned as shown.
 - Thread the webbing, during winding, through the additional suspension; that is, pendant (7) or components as required.
 - Insert the bushings (5) through the loops of the inner and outer wraps.
 - Install the bolts (3), links (4), bushings (5), and nuts (6).

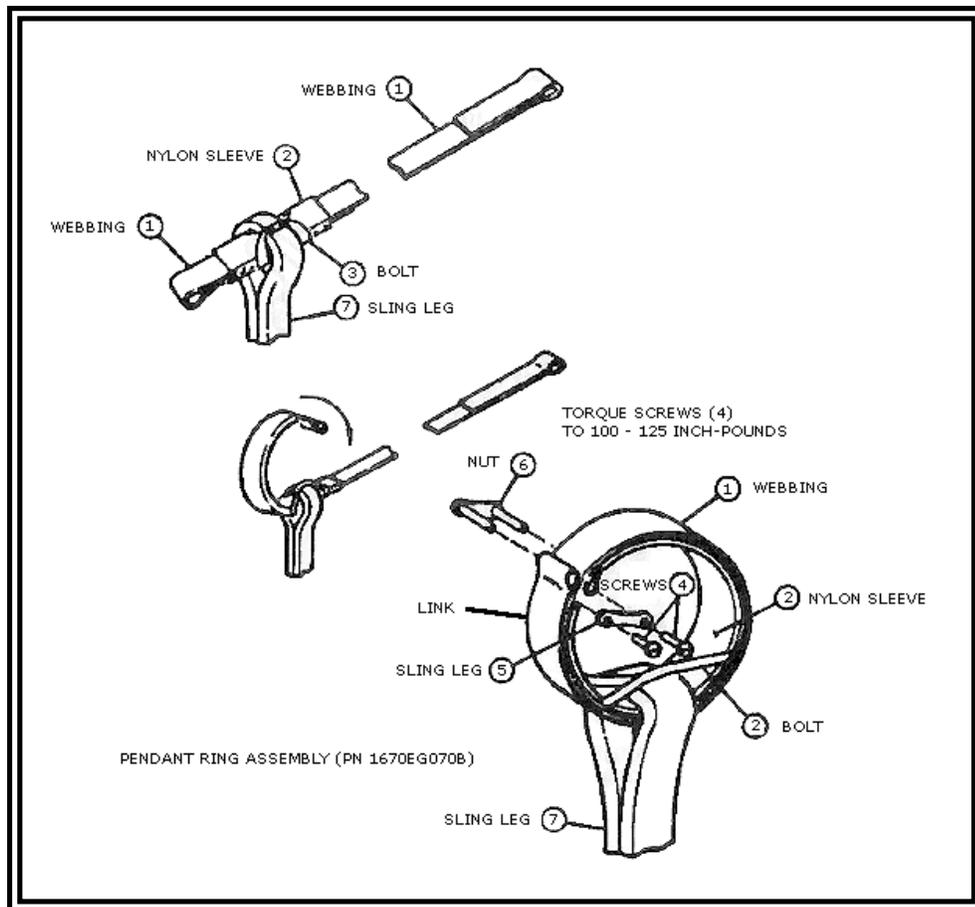


Figure 4-8. Attachment of Pendant Assemblies to Pendant Adapter

Alternate Method

4-12. The pendant assemblies can be attached to the pendant adapter using the rotor head shackle (Fig. 4-9). Use the following procedure:

- Remove the quick-disconnect pin from the shackle pin (Fig. 4-10).
- Unscrew the shackle pin and remove it from the shackle.
- Place, as required, one-ring assembly or two-ring assemblies of the pendant assemblies on the shackle.
- Position the loop of the pendant adapter in the rotor head shackle.
- Install the shackle pin, making sure that it passes through the loop of the pendant adapter.
- Insert the quick-disconnect pin.

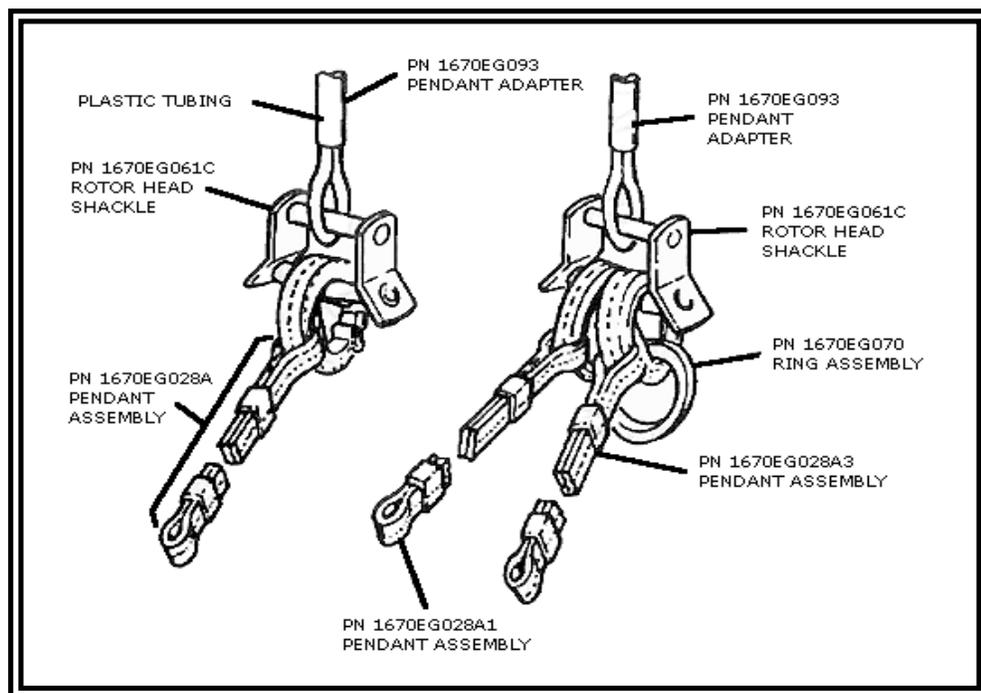


Figure 4-9. Typical Lift Pendant Arrangement using Rotor Head Shackle

ATTACHING BELLYBAND ASSEMBLIES TO LIFT PENDANT

4-13. Figure 4-10 shows the bellyband assemblies attached to the single-leg lift pendant arrangement using the rotor head shackle. It also shows the assembly of the grab links and the coupling links to the rotor head shackle.

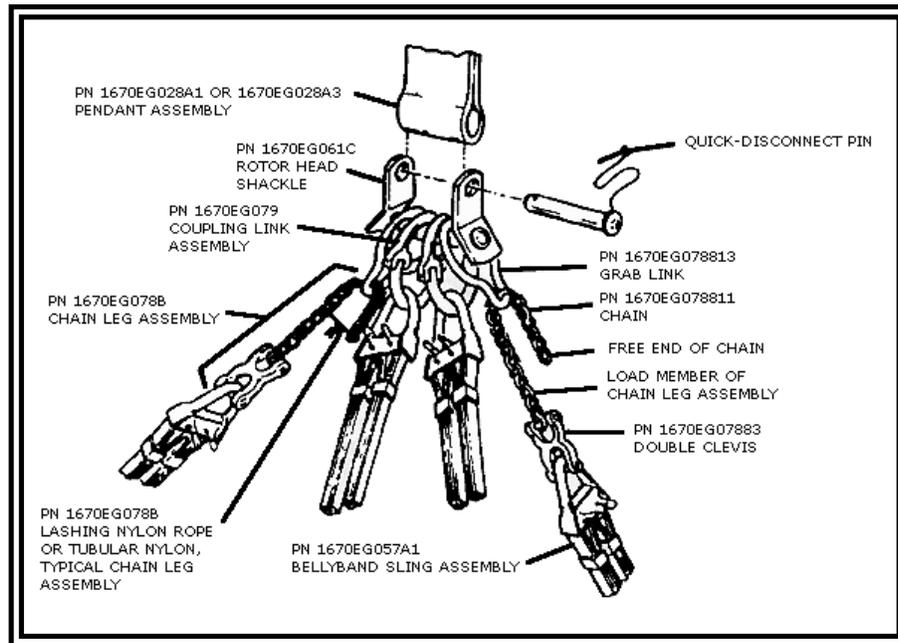


Figure 4-10. Typical Attachments of Bellyband to Rotor Head Shackle

INSTALLING THE ROTOR HEAD SLING

4-14. The rotor head sling arrangement may be used to lift lightweight helicopters by their rotor heads. Figure 4-11 shows a typical rotor head sling installation, including the use of antichafe pads.

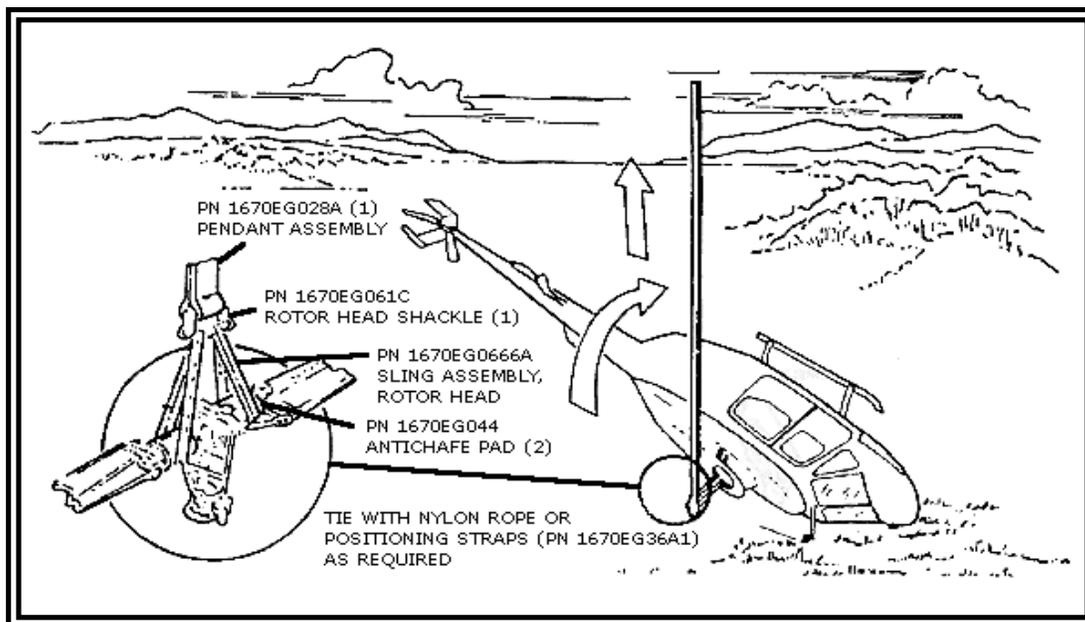


Figure 4-11. Typical Rotor Head Sling Installation

RIGGING AIRCRAFT FOR GROUND RECOVERY

4-15. Rigging aircraft for ground recovery is essentially the same as for aerial recovery. The aircraft is prepared for lifting onto the transport vehicle; components (bellybands, slings, etc.) of the aerial recovery kit are used. The only major difference is that the device used to actually perform the lift is a crane, or similar piece of equipment, instead of a helicopter. Any disassembly of the aircraft required because of road obstacles—or size of the transport vehicle—is performed using procedures outlined in the appropriate aircraft technical manual. Procedures outlined in the appropriate aircraft shipping manual are used to prepare any devices (cradles, shipping skids, etc.) required for loading the aircraft onto the transport vehicle. Observe the same basic safety procedures (disarming, disconnecting batteries, etc.) adhered to during aerial recovery during ground recovery.

4-16. An aircraft may have severe crash damage; that is, major portions of the aircraft such as the engine, transmission, and rotor system were torn from the aircraft. If so, rigging procedures may require modification to suit the situation. The ground personnel determine the method used to lift the aircraft. The primary concerns in this situation are to minimize further damage to the aircraft and ensure the safety of the ground crew.

4-17. Nonflyable aircraft may be transported between maintenance facilities or moved because of relocation of the maintenance facility. When this occurs, the aircraft will be prepared and loaded for ground transport as specified in the applicable shipping manual. The procedures outlined in shipping manuals are used when shipping flyable aircraft over extended distances. The same procedures are effective for moving aircraft intact but not flyable because of maintenance. Use of these procedures will minimize the possibility of damage to the aircraft occurring as a result of movement. Sling loading is an option in this situation; however, the chance of damage occurring to the transported aircraft is much greater than with ground transport. The availability urgency of the situation and the transportation assets determine the method of movement to be used.